

IN THE CLAIMS

1 16. (currently amended) A downhole injection evaluation system comprising:

- 2 a) at least one downhole fiber optic sensor permanently disposed in an
3 ~~injection~~ a first well for sensing at least one parameter associated with
4 injecting a fluid into a formation.

5
1 17. (currently amended) A downhole injection evaluation system as claimed in claim 16
2 wherein said system further includes an electronic controller operably connected to said
3 at least one downhole fiber optic sensor.

4
5 18. (currently amended) A downhole injection evaluation system as claimed in claim 17
6 wherein said at least one downhole fiber optic sensor is operably connected to ~~at least one~~
7 ~~production well~~ an additional sensor in a second well ~~to provide said electronic~~
8 ~~controller, operably connected to said at least one downhole sensor and to said at least~~
9 ~~one production well sensor, with information from both sides of a fluid front moving~~
10 ~~between said injection well and said production well.~~

11
1 19. (currently amended) A system for ~~optimizing~~ controlling hydrocarbon production
2 comprising:

- 3 a) a production well;
4 b) an injection well having a data link to [,] said production well , ~~and said~~

5 ~~injection well being data transmittably connected;~~

6 c) at least one sensor located in either of said injection well and said
7 production well, said at least one sensor being capable of sensing at least one parameter
8 associated with an injection operation, said sensor being operably connected to a
9 controller for controlling injection in the injection well.

10

1 20. **canceled**

2

1 21. A downhole injection evaluation system as claimed in claim 17 wherein said
2 system further includes at least one downhole acoustic signal generator whereby signals
3 generated by said at least one signal generator reflect off a flood fluid/hydrocarbon
4 interface and are received by said at least one downhole sensor.

5

24. **canceled**

1 60. (new) The system of claim 16 wherein said at least one fiber optic sensor is disposed
2 in one of (i) a production well, and, (ii) an injection well.

3

1 61. (new) The system of claim 17 wherein said electronic controller is at a surface
2 location.

3

1 62. (new) The system of claim 17 wherein said electronic controller is at a downhole

2 location.

3

1 63. (new) The system of claim 18 wherein said first well is one of (i) an injection
2 well, and, (ii) a production well, and wherein said second well is the other of (i) an
3 injection well, and, (ii) a production well.

4

1 64. (new) The system of claim 18 wherein said sensor in said first well is operably
2 connected to said sensor in said second well by a fiber optic link.

3

1 65. (new) The system of claim 63 further comprising a controller for controlling a
2 flow control device in at least one of the first well and the second well.

3

1 66. (new) The system of claim 65 wherein said flow control device is selected from
2 the group consisting of: (i) a valve, (ii) fluid control device, (iii) packer, (iv) sliding
3 sleeve, (v) safety valve, (vi) an anchor, and (vii) a pump.

4

1 67. (new) The system of claim 63 further comprising an acoustic receiver in at least
2 one of the first well and the second well.

3

1 68. (new) The system of claim 67 further comprising an acoustic transmitter in at
2 least one of the first well and the second well.

3

1 69. (new) The system of claim 67 wherein said acoustic receiver receives acoustic
2 signals indicative of a location of fluid front between the first well and the second well.
3

1 70. (new) The system of claim 67 wherein said acoustic receiver receives acoustic
2 signals indicative of a fracture between the first well and the second well.
3

1 71. (new) The system of claim 70 wherein said signals are produced by a change in
2 said fracture.
3

1 72. (new) The system of claim 68 wherein said acoustic receiver receives acoustic
2 signals indicative of a location of fluid front between the first well and the second well.
3

1 73. (new) The system of claim 68 wherein said acoustic receiver receives acoustic
2 signals indicative of a fracture between the first well and the second well.
3

1 74. (new) A method of producing hydrocarbons from a subterranean reservoir
2 comprising:

3 a) permanently installing at least one downhole fiber optic sensor in a first
4 well for sensing at least one parameter associated with injection of a fluid
5 into said reservoir.
6

1 75. (new) The method of claim 74 further comprising using an electronic controller

2 operably connected to said at least one downhole fiber optic sensor.

3

1 76. (new) The method of claim 75 further comprising operably connecting said at
2 least one downhole fiber optic sensor to an additional sensor in a second well.

3

1 77. (new) The method of claim 74 further comprising

2 (i) using at least one downhole acoustic signal generator for
3 generating signals that interact with a flood front in said reservoir, and

4 (ii) receiving signals resulting from said interaction with said at least
5 one downhole sensor.

6

1 78. (new) The method of claim 74 further comprising disposing said at least one fiber
2 optic sensor in one of (i) a production well, and, (ii) an injection well.

3

1 79. (new) The method of claim 75 further comprising positioning said electronic
2 controller at a surface location.

3

1 80. (new) The method of claim 75 further comprising positioning said electronic
2 controller at a downhole location.

3

1 81. (new) The method of claim 76 wherein said first well is one of (i) an injection
2 well, and, (ii) a production well, and wherein said second well is the other of (i) an

3 injection well, and, (ii) a production well.

4

1 82. (new) The method of claim 76 further comprising operably connecting said sensor
2 in said first well to said sensor in said second well by a fiber optic link.

3

1 83. (new) The method of claim 81 further comprising using a controller for
2 controlling a flow control device in at least one of the first well and the second well.

3

1 84. (new) The method of claim 83 wherein said flow control device is selected from
2 the group consisting of: (i) a valve, (ii) fluid control device, (iii) packer, (iv) sliding
3 sleeve, (v) safety valve, (vi) an anchor, and (vii) a pump.

4

1 85. (new) The method of claim 81 further comprising using an acoustic receiver in at
2 least one of the first well and the second well for receiving acoustic signals.

3

1 86. (new) The method of claim 81 further comprising using an acoustic transmitter in
2 at least one of the first well and the second well for sending acoustic signals into said
3 reservoir.

4

1 87. (new) The method of claim 85 further comprising using said acoustic receiver for
2 receiving acoustic signals indicative of a location of fluid front between the first well and
3 the second well.

4

1 88. (new) The method of claim 85 further comprising using said acoustic receiver for
2 receiving acoustic signals indicative of a fracture between the first well and the second
3 well.

4

1 89. (new) The method of claim 88 wherein said signals are produced by a change in
2 said fracture.

3

1 90. (new) The method of claim 85 further comprising using said acoustic receiver for
2 receiving acoustic signals indicative of a location of fluid front between the first well and
3 the second well.

4

1 91. (new) The method of claim 85 further comprising using said acoustic receiver for
2 receiving acoustic signals indicative of a location of a fracture between the first well and
3 the second well.

4

1 92. (new) The method of claim 81 further comprising:

2 (i) using an acoustic transmitter in one of said two wells for
3 propagating acoustic signals into said reservoir, and

4 (ii) using an acoustic receiver in the other of said two wells for
5 receiving said signals after passing through said reservoir.

6

1 93. (new) The method of claim 92 further comprising using a controller for
2 processing said signals and determining from said received signals an indication of
3 pressure transmissivity of said reservoir.
4

1 94. (new) The method of claim 92 further comprising:
2 (A) using a controller for processing said received signals,
3 (B) using a controller for controlling the operation of a fluid control
4 device in at least one of the first well and the second well.
5